Amendments to the Claims:

The following Listing of the Claims replaces all previous listings and versions of the claims in the application:

Listing of the Claims:

1. (Currently Amended) A method of diagnosing corrosion risk of a pipe or a pipeline buried in soil due to DC stray currents and/or AC voltages induced in the soil, comprising:

i) providing a two-part metal probe including a first probe part having a first metal element of a first size and a first specific resistivity, said first probe part constituting an exposed element, and a second probe part having a second metal element of a second size and a second specific resistivity, said second probe part ~~being hermetically sealed and~~ constituting [[a]] an environmentally isolated reference element[[,]];

ii) burying said two-part metal probe in said soil[[,]];

iii) electrically connecting said two-part metal probe to said pipe or pipeline;

[[iii)]] iv) measuring [[the]] an AC current flowing between said pipe or said pipeline and said two-part metal probe[[,]] while said pipe or said pipeline and said two-part metal probe are electrically connected;

v) electrically disconnecting said two-part metal probe from said pipe or pipeline;

[[iv)]] vi) measuring [[the]] an AC voltage between said pipe or said pipeline and said two-part metal probe[[,]] while said pipe or pipeline and said two-part metal probe are disconnected from one another;

[[v)]] vii) measuring [[the]] a spread resistance based on said AC current determined in step [[iii)]] iv) and said AC voltage measured in step [[iv)]] vi) according to Ohm's Law[[,]];

[[vi)]] viii) passing a first excitation current through said first probe part and determining the voltage generated by said first excitation current across said first probe part for measuring the resistance of said first probe part according to Ohm's Law[[,]] while said pipe or pipeline and said two-part metal probe are disconnected from one another;

[[vii)]] ix) passing a second excitation current through said second probe part and determining the voltage generated by said second excitation current across said second probe part for measuring the resistance of said second probe part according to Ohm's Law[[,]] while said pipe or pipeline and said two-part metal probe are disconnected from one another;

[[viii)]] x) storing said measurements provided in steps ~~iii), iv), v), vi) and vii),~~ iv), vi), vii), viii), and ix);

[[ix)]] xi) repeating said steps iii)~~, iv), v), vi), vii) and viii)~~ through x) periodically,

[[x)]] xii) determining [[the]] an actual corrosion of said first probe part based on the measurements performed in steps [[vi)]] viii) and [[vii)]] ix) according to a mathematical corrosion algorithm[[,]]; and

[[xi)]] xiii) diagnosing the risk of corrosion of said pipe or pipeline based on an empirical combination of the actual corrosion of said first probe part, said spread resistance determined in step [[v)]] vii) and said AC voltage measured in step [[iv)]] vi).

2. (Original) The method according to claim 1, said first probe part and said second probe part having identical metal elements.

3. (Currently Amended) The method according to claim 1, said step [[x]] xii being performed in accordance with the following equation:

$$\sigma(t) = \sigma(t=0) \cdot \frac{R_R(t)}{R_C(t)} \cdot \frac{R_C(t=0)}{R_R(t=0)}$$

4. (Currently Amended) The method according to any of the claims 1-3, said diagnosing of step [[xi)]] xiii being performed in accordance with the following table:

Event	Active corrosion	Spread resistance	AC voltage	Diagnose
1	No	high (1-10Ωm²)	low (below approx. 10V)	No risk
2	No	high (1-10Ωm²)	high (above approx. 10V)	No critical condition but monitor spread resistance further

3	No	low (0.001-0.1Ωm²)	low (below approx. 10V)	No critical condition but be aware of increased AC voltage
4	No	low (0.001-0.1Ωm²)	high (above approx. 10V)	Risk of AC corrosion incubation period
5	Yes	low (0.001-0.1Ωm²)	high (above approx. 10V)	AC corrosion – take mitigation actions
6	Yes	low (0.001-0.1Ωm²)	low (below approx. 10V)	Corrosion may arise from DC stray current
7	Yes	high (1-10Ωm²)	low (below approx. 10V)	Corrosion may arise from DC stray current
8	Yes	high (1-10Ωm²)	high (above approx. 10V)	Corrosion may arise from DC stray current

5. (Currently Amended) The method according to claim 4, wherein said spread resistance [[being]] is high ~~provided~~ if the value of said spread resistance [[being]] is above 0.1-1 Ohm, and [[being]] low ~~provided~~ if the value of said spread resistance [[being]] is below 0.1-1 Ohm.

6. (Currently Amended) The method according to claim 4, wherein said AC voltage [[being]] is high ~~provided~~ if said voltage [[being]] is higher than approximately 10V.

7. (Currently Amended) The method according to any of the claims 1-3, said steps iii~~, iv, v, vi, and viii~~ through x being repeated with a frequency of one or more days.

8. (Currently Amended) A system [[of]] for diagnosing corrosion risk of a pipe or a pipeline buried in soil due to DC stray currents and/or AC voltages induced in the soil, comprising:

i) a two-part metal probe including a first probe part having a first metal element of a first size and a first specific resistivity, said first probe part constituting an exposed element, and a second probe part having a second metal element of a second size and a second specific resistivity, said second probe part ~~being hermetically sealed and~~ constituting [[a]] an environmentally isolated reference element~~, and having a cable for connection to an external measuring apparatus,~~;

ii) a switching device operable for the selective electrical connection and disconnection of said two-part metal probe and said pipe or pipeline;

[[ii)]] iii) a measuring apparatus electrically connected to said two-part metal probe and including:

~~a housing,~~

~~a cable connector for the connection of said cable of said two-part metal probe to said external measuring apparatus included within said housing,~~

an AC current measuring circuit operable for measuring [[the]] an AC current flowing between a pipe or pipeline and the two-part metal probe when said probe is buried in said soil[[,]] while said two-part metal probe is electrically connected to said pipe or pipeline;

an AC voltage measuring circuit operable for measuring [[the]] an AC voltage between said pipe or said pipeline and said two-part metal probe when said two-part metal probe is buried within said soil[[,]] while said two-part metal probe is electrically disconnected from said pipe or pipeline;

a resistance measuring circuit connected to said AC current measuring circuit and said AC voltage measuring circuit and operable for determining [[the]] a spread resistance based on Ohm's Law[[,]];

a current excitation circuit operable (a) for passing through said cable a first excitation current to said first probe part while said pipe or pipeline and said two-part metal probe are disconnected from one another; [[and]] (b) for measuring the voltage generated by said

first excitation current across said first probe part for measuring the resistance of said first probe part according to Ohm's Law; [[and]] (c) for passing a second excitation current through said cable to said second probe part while said pipe or pipeline and said two-part probe are disconnected from one another; and (d) for determining the voltage generated by said second excitation current across said second probe part for measuring the resistance of said second probe part according to Ohm's Law[[,]];

a data processor operable for determining an actual corrosion of said first probe part based on the measured resistances of the first and second probe parts according to a mathematical corrosion algorithm;

a storage [[means]] device operable for storing the measurements made by said AC current measuring circuit, said AC voltage measuring circuit, said spread resistance measuring circuit and said current excitation circuit[[,]]; and

a diagnosing circuit operable for diagnosing the risk of corrosion of said pipe or pipeline based on an empirical combination of the actual corrosion of said first probe part, said spread resistance and said AC voltage.

9. (Previously Presented) The system according to claim 8, wherein said measuring apparatus includes a micro processor constituting part of said AC current measuring circuit, said AC voltage measuring circuit, said spread resistance measuring circuit, said current excitation circuit, said storing circuit, and said diagnosing circuit, said micro processor controlling the overall operation of the apparatus for periodically repeating the measurements.

10. (Previously Presented) The system according to any of the claims 8 or 9, wherein said measuring apparatus includes two or more cable connectors for establishing connections to two or more two-part metal probes.

11. (Currently Amended) The system according to any of the claims 8-9, wherein said measuring apparatus further includes a data connector configured for connecting to an external device, ~~said external device~~ operable for receiving information regarding said two-part metal probe.

Claims 12 – 14: (Canceled)